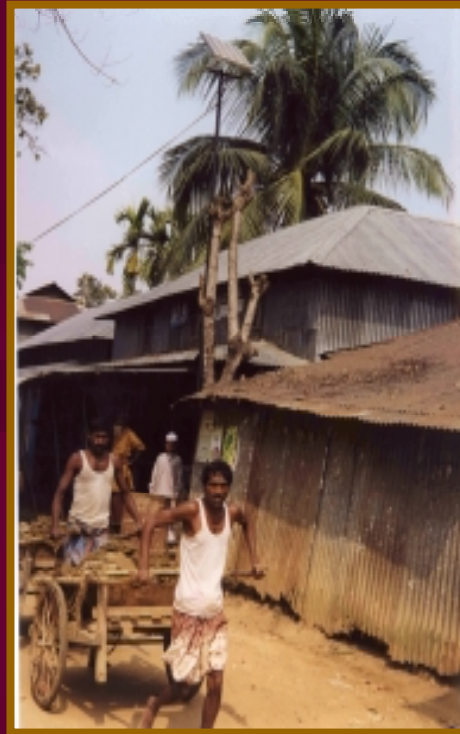


# **Mobilization of Local Entrepreneurship for Delivery of Rural Services**



## **Experience of Grameen Shakti**

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Paper presented at the Conference on “Village Power 2000: Empowering People and Transforming Markets” organized by World Bank, USAID, NREL, and Winrock International held on December 5-6, 2000 at Washington DC, USA.

# Background

- Out of 21 million households of Bangladesh, about 16% have come under the electric national grid network where 84% are deprived.
- This obstacle prevents the rural poor people to earn their full potential.
- In response to this energy crisis Grameen Shakti was established in 1996 as a member of Grameen family of companies

## Background .....

- Grameen Shakti is a company “Not for Profit” and limited by guarantee
- The aim is to develop and popularize renewable energy resources for income generation activities that helps to alleviate poverty.

# Objectives

The main objectives of Grameen Shakti are as follows:

- popularizing and delivering renewable energy to the rural households.
- marketing solar, bio-mass and wind energy on commercial basis
- providing services that helps to alleviate poverty and protect environment through applied research and development of renewable energy based technologies

## Objectives.....

- developing and implementing special credit, savings and investment programs for generation, storage, and utilization of renewable energy for benefit of the rural people
- testing the new and appropriate technologies to provide more cost effective energy services at affordable price to the non-electrified areas

# Programs of Grameen Shakti



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graph TD; A[Programs of Grameen Shakti] --> B[Solar Program]; A --> C[Wind Program]; A --> D[Biogas Program]; A --> E[Biomass Gasification Program]; A --> F[R & D Program]; B --> G[Training Program]; B --> H[Demonstration Program];
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The diagram is an organizational chart for Grameen Shakti's programs. At the top is a blue box labeled 'Programs of Grameen Shakti'. A vertical arrow points down from this box to a horizontal line. From this horizontal line, five arrows point down to five separate blue boxes arranged horizontally: 'Solar Program', 'Wind Program', 'Biogas Program', 'Biomass Gasification Program', and 'R & D Program'. From the 'Solar Program' box, two arrows point down to two more blue boxes: 'Training Program' and 'Demonstration Program'.

Solar  
Program

Wind  
Program

Biogas  
Program

Biomass  
Gasification  
Program

R & D  
Program

Training Program

Demonstration  
Program

# Solar PV Program of Grameen Shakti

The main objectives of this program are -

- To disseminate the PV technology
- To promote sales of SHS
- To develop awareness on SHS
- To train customers on use and maintenance of Solar Home Systems (SHS)
- To disseminate the technology among villagers in rural and remote areas

# Use of Solar PV System

- Lighting house, shop, office, school, college, mosque
- Operate TV, cassette, radio, VCP etc.
- Operate small fan and microphone
- Charge cell phone and mobile phone battery
- Operate computer
- Run any type of DC appliances like DC sewing machine, soldering iron etc.

# Solar Home System

A SHS provides electricity produced from the sunlight

- There are four components in a Solar Home System
  - Solar Panel: converts sunlight into electricity
  - Battery: stores the electrical energy
  - Charge controller: regulates charging and discharging of battery, and
  - Appliances: different types of electric appliances such as lamp, television, DC fan, phone, computer, etc.

# Marketing Strategy

- GS promotes/markets solar home systems in remote rural areas
- GS provides training
- GS encourages customers to develop income generating activities.

## Marketing Strategy (Continued)

- Grameen Shakti execute its PV program through unit offices
- GS selects the areas for establishing a unit office depending on the following criteria:
  - Non availability of grid connected electricity
  - Distance of grid lines from the area
  - The socio-economic conditions of the people living in the areas
  - Scope for productive use of solar home system (SHS)

## Working Areas under the PV Program

<u>Working Areas</u>	<u># of Offices</u>	<u>Working Areas</u>	<u># of Offices</u>
1. Tangail	3	9. Cox's Bazar	2
2. Mymensingh	7	10. Bagerhat	1
3. Comilla	2	11. Sylhet	1
4. Khulna	3	12. Sunamganj	1
5. Satkhira	2	13. Cox's Bazar	2
6. Barguna	3	14. Chandpur	1
7. Patuakhali	1	Total offices	26
8. Panchagar	1		



## Districtwise # of Unit Offices

Tangail (3)  
Mymensingh (5)  
Sherpur (2)  
Shatkhira (2)  
Khulna (3)  
Bagerhat (1)  
Comilla (1)  
Borguna (2)  
Patuakhali (1)  
Pirozpur (1)  
Ponchogor (1)  
Sunamgonj (1)  
Cox's Bazar (2)  
Chandpur (1)



Solar Light Used in Fulpur Unit Office of Grameen Shakti

## Financing the Customer

- GS provides finance to its customer who intend to buy a system
- There are two types of financing schemes:
  - Option 1
    - The customer has to pay 15% of the total price of the system
    - The rest amount (85%) will be paid with 12% service charge within 3 years through 36 monthly installments

- Option 2
  - The customer has to pay 25% of the total price of the system
  - The rest amount (75%) will be paid with 8% service charge within 2 years through 24 monthly installments
- Option 3
  - In case of cash purchase GS provide 4% discounts on total price

## After Sales Maintenance

GS provides one year free maintenance to its customers.

- Engineers of GS visit the customers each month to collect the installments and during the visit he/she checks the systems and takes corrective measures if necessary.
- There is a “Maintenance Card” with each PV system. The engineers record the problem and the action taken in the card.
- Besides, whenever any customer faces any problem representative from GS attends the maintenance call.

# Training on Installation and Maintenance

GS train the people in rural areas so that they can easily take care of the system and also can familiar with the PV technology. GS provides two types of training: technician training and customer training

## ❑ Technician Training

- GS trains the local young men and women on operation, installation and maintenance of PV systems
- These technicians are expected to gradually take over after sales service
- So far Grameen Shakti has trained 200 local technicians



Technician Training

## Training on Installation and Maintenance .....

### ❑ Customer Training

- GS trains customers for better maintenance of the systems
- So far GS has trained 1500 customers
- The trained customers can easily take care of minor problems of their systems
- Gradually all customers will be brought under the training program



Customer Training



Customer Training (Women)

## Dissemination of Solar PV Technology

- ▣ Arrange demonstration meeting in village bazar, school, college, market places and in Govt. offices
- ▣ Visit door to door to build up awareness and demonstrate the SHSs
- ▣ Explain the conversion of electricity from the sunlight.
- ▣ Distribution of leaflet, brochure and posters on PV program
- ▣ Show video programs on PV activities



Demonstration Meeting to Build up the Awareness on Solar Technology



A Mobile Grocery Shop with Solar System



Solar System – Used in Village market & Mosque



Solar Light – Used in a Pharmacy



Solar Light Used in Children's Education & Clinic



Solar Light Used in Flour & Saw Mill



Solar Light Used in Grameen Bank Branch Office



Solar Panel System Used in Computer of GB Branch



Solar Panel Used in a Household



Solar Panel Used in a Rural Household



Solar Panel Used in a Household

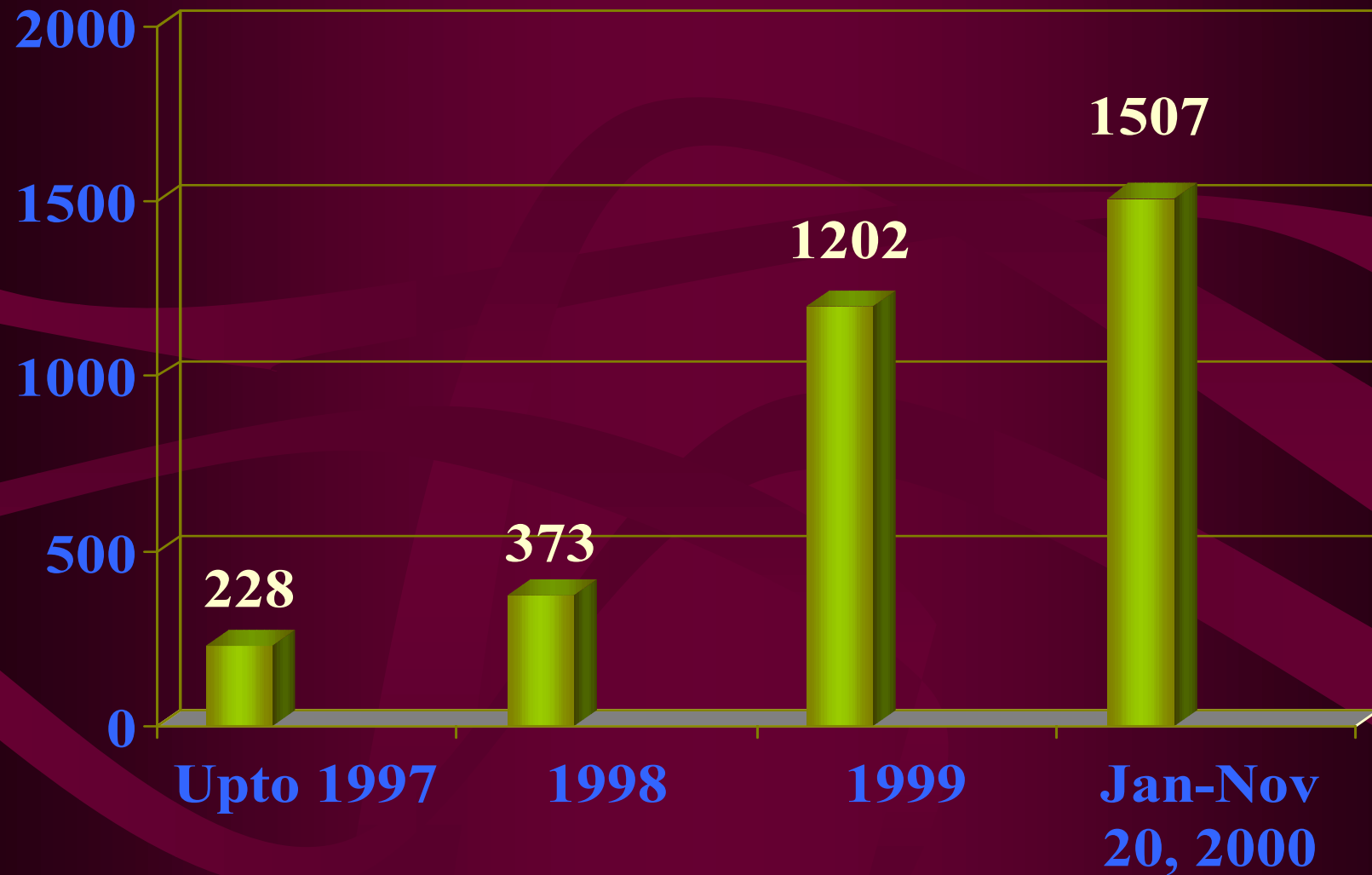


Solar Panel System Used for Recreation

# Sales of PV Systems according to District and Period

<u>Area</u>	<u>Upto 1997</u>	<u>1998</u>	<u>1999</u>	<u>JAN-20 Nov'00</u>	<u>Cumulative</u>
Tangail	95	75	188	245	603
Mymensungh	92	136	371	292	891
Sherpur	0	11	105	82	198
Comilla	20	24	71	145	260
Satkhira	0	53	148	182	383
Khulna	0	29	209	316	554
Sylhet	0	0	0	6	6
Cox's Bazar	0	0	0	20	20
Other Districts	0	4	91	191	286
Head Office	21	43	19	28	111
<b>Total</b>	<b>228</b>	<b>373</b>	<b>1202</b>	<b>1507</b>	<b>3310</b>

# Progress of PV Sales



# Customers Satisfaction

- **Quality:** Standard of living has improved
- **Value:**
  - Become Owner of SHSs
  - Children education have improved
  - Can work at night
  - People can increase income by extending working hours
  - Generate new ideas of income
  - Women feel secured at night
- **Service:** Customers are happy by receiving quality services of the system and sufficient help from GS personnel.



# Impact of Solar Energy Program

- ☑ 3310 solar home systems have already been installed in different places of the country
- ☑ Children's education and other home activities have improved
- ☑ Ownership of SHS (Power generator)
- ☑ Increased income due to extension of working hours after dusk
- ☑ Starting of new business like radio/TV repairing shop, telephone service, power selling service, etc

## Impact of Solar Energy Program .....

- ☑ Productivity has also improved due to use of computer by PV system
- ☑ PV system has opened up new opportunities for employment
- ☑ Create new entrepreneurs
- ☑ Over all, the quality of life of the customers has also improved.

# Micro Utility of Solar System in a Village Market

- Mr. Umor Ali has bought a 50Wp System with 5 lamps by paying Tk. 26000 (US\$ 470).
- He rents 4 lamps to his near by shopkeepers.
- After installing the system he is getting the following advantages:
- Earning Tk.600 per month by selling power (@ Tk.150 per lamp per month, US \$ 1 = Tk.55)

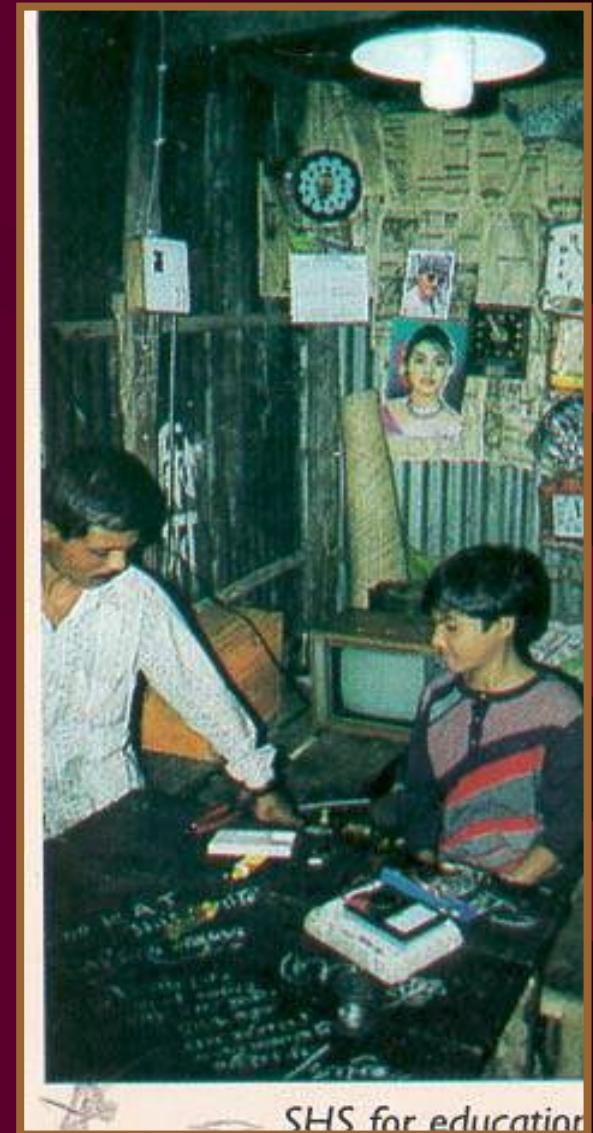
## Micro Utility of Solar System in a Village Market.....

- Earning more from his shop by attracting more customers at night by brighter light.
- Not only Mr. Umor but also the other shopkeepers increased their income due to the solar light.
- Customers feel secured in shopping at night.
- Improve standard of living of the villagers



# Solar System used in a Radio/TV Repairing Shop

- ◆ Mr. Manik Mia (Husband of Grameen Bank member) bought a 34W SHS on credit. The System cost Tk. 17000 (US\$309). He has a TV/radio repairing shop.
- ◆ He use the system to lit 2 lamps and powering a DC soldering iron.



## Solar System used in a Radio/TV Repairing Shop.....

- ◆ Before installing the system he could not use the soldering iron properly and could not work at night.
- ◆ Now he is extending his working hours and can work smoothly and more efficiently.
- ◆ He is earning US\$20 more per month than before.

# The world become smaller to a rural women

- Ms. Abeda, a member of Grameen Bank using a solar home system for lighting and charging phone.
- She can communicate with her relatives working in towns and cities of home and abroad.



The world become smaller to a rural women.....

- This communication facility through this phone can be availed by other villagers of the locality
- She earns US\$100 per month from the phone.
- The system also help her children for their education

## Business with Cell Phone Powered by Solar PV System

- The PV systems are being used to power the cell-phone system.
- A 50 Wp panel along with a 100 AH battery can provide power for nearly 18 hours operation per day. The system cost along with the phone is Tk. 73,000 (US\$ 1327). The cost of the solar system is Tk. 23,000 (US\$ 418) and the cost of the phone is Tk. 50,000 (US\$909).

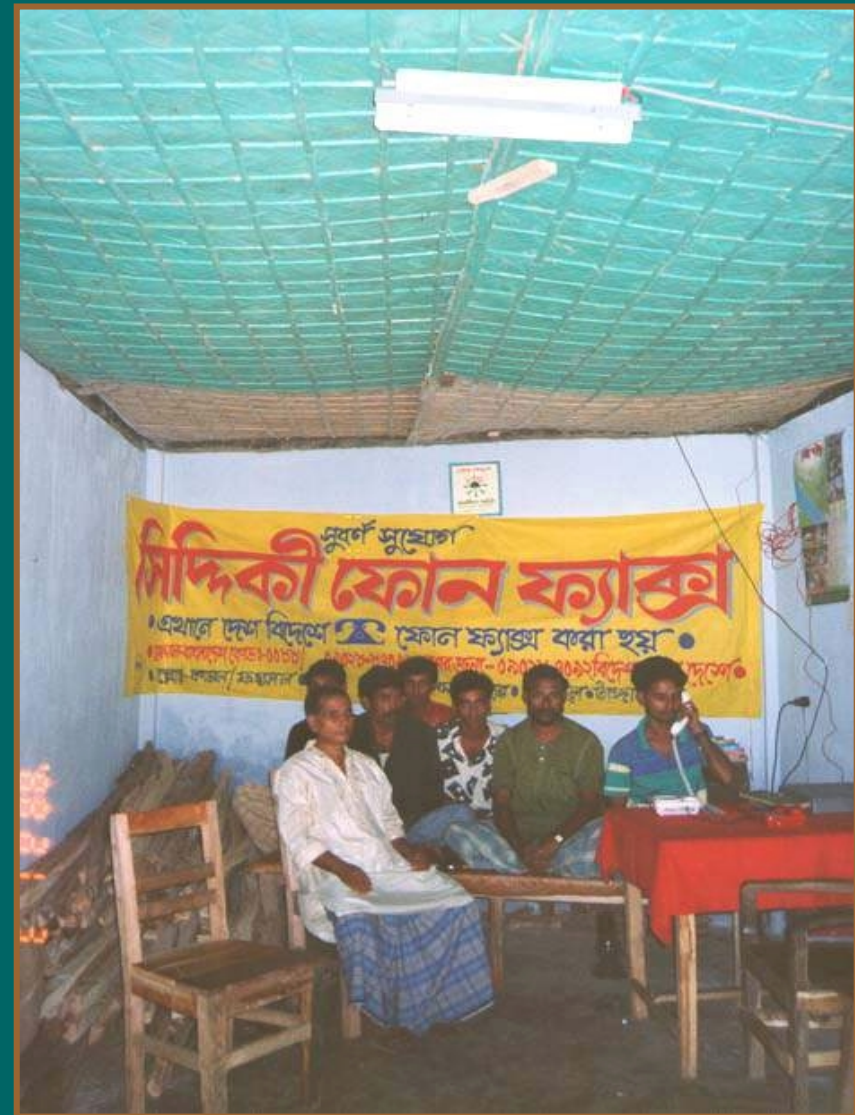
## Business with Cell Phone Powered by Solar PV System.....

- Usually these systems are run by entrepreneurs in rural market places.
- This service has become a lucrative business for the entrepreneurs.
- GS has 10 customers who used this type of system.

# Cost effective analysis of the solar PV system

Description	Year 1	Y-2	Y-3	Y-4	Y-5
Net Income from telephone Service (After payment to BRTA)	120000	120000	120000	120000	120000
Expenses:					
Payment to the entrepreneur (Self Salary)	60000	60000	60000	60000	60000
Maintenance expense	890	890	890	890	890
Interest expense	1175	1175	1175	0	0
Depreciation	4008	4008	4008	4008	4008
Total Expenses	66073	66073	66073	64898	64898
Net profit	53927	53927	53927	55102	55102

- From the above table we can see that the payback period is 1.35 years.



Cell Phone (Fixed) Powered by Solar PV System

# Impact of Photovoltaic on Women

- ❑ Providing better household environment.
- ❑ Eliminate harmful Kerosene lamp.
- ❑ Improvement in women security at night.
- ❑ Income generating activities by sewing clothes, making baskets at leisure at night.



# Wind Program

## Concept

Developing micro-enterprise zone by providing electricity from wind energy

## Target

Rural Areas

Households

Enterprises in rural bazar

## Progress

Installed 6 wind turbines in coastal areas

4 of them are hybrid systems (Wind/Diesel back-up)

Power being supplied to the cyclone shelter of Grameen Bank and some customers



# Biogas Program

## Concept

- Cow dung is widely used as fertilizer and cooking fuel in rural Bangladesh.
- But the fire and smoke from cow dung creates health hazards.
- Also indiscriminate cutting of trees for firewood has created disastrous environmental problem in Bangladesh.
- GS is promoting bio-digester to produce both clean burning biogas and residues to be used in the field as fertilizer or in the ponds for fish cultivation.

## Biogas Program.....

### Progress

- So far GS has installed 30 Biogas plant in northern part of Bangladesh
- Inspired and provides training to the customers for producing biogas from their own resources.

# Research Program

- ❑ Explore ways to develop appropriate technologies and their uses
- ❑ Develop methods to popularize and making the renewable energy systems easily accessible to large number of population

## Research Program.....

- ❑ Innovate financial services for the customers to facilitate rapid expansion of use of renewable energies
- ❑ Develop and fabricate the solar home system accessories.
- ❑ Develop low cost charge controller, lamps, DC to DC converters, TV guard to reduce the total system cost.

# Research Output

Grameen Shakti has developed the following components

- Low cost 12V, 6W fluorescent lamp.  
So far fabricated 1600 lamps
- Low cost 12V, 8W fluorescent lamp.
- Low cost charge controller (both 10A and 15A capacity)

## Research Output.....

- “TV guard” to protect the TV against increase in battery voltage above 12V DC.
- DC-DC converters with 3, 6 and 9 volt output to operate cassette player, radio etc. So far fabricated 1000.
- Reduced the blackening problems associated with the fluorescent lamp.

## Computer Training Center in Remote Island Kutubdia

- Kutubdia is a very remote island situated in the southern part of Bangladesh. Total population of this island is 150 thousand
- There has no grid electricity in this area. The only source of electricity is the electricity from diesel generator which is most of the time out of order.

## Computer Training Center.....

- GS set-up four computers in this remote island which are powered by solar photovoltaic system.
- This center will be used as computer training center for educating the local people.
- According to the village people by getting training from this center they can build up their carrier and make them fit for this new century.



Solar Panel System used in Computer  
Training Center at Kutubdia Island



Solar Panel System used in Computer  
Training Center at Kutubdia Island

# Future Plan

- GS has planned to install 13100 solar home systems within next 5 years.
- 20 small battery-charging stations, powered by solar PV, will be installed within next 2 years.
- 20 computer-training centers, powered by solar PV, will be installed within next 2 years.
- 20 multi service centers, powered by solar PV, will be installed within next 2 years.



Thank You  
for  
Your Kind Attention